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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/573,959	03/29/2006	Shigeki Satou	890050.538USPC	1743

500 7590 07/17/2008

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EXAMINER	
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ART UNIT	PAPER NUMBER
1796	

MAIL DATE	DELIVERY MODE
07/17/2008	PAPER

Please find below and/or attached an Office communication concerning this application or proceeding.

The time period for reply, if any, is set in the attached communication.

Office Action Summary	Application No.	Applicant(s)	
	10/573,959	SATOU ET AL.	
	Examiner	Art Unit	
	KHANH T. NGUYEN	1796	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

1)☒ Responsive to communication(s) filed on *05 March 2008*.

2a)☒ This action is **FINAL**. 2b)☐ This action is non-final.

3)☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

4)☒ Claim(s) *1-9 and 11-16* is/are pending in the application.

4a) Of the above claim(s) _____ is/are withdrawn from consideration.

5)☐ Claim(s) _____ is/are allowed.

6)☒ Claim(s) *1-9 and 11-16* is/are rejected.

7)☐ Claim(s) _____ is/are objected to.

8)☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

9)☐ The specification is objected to by the Examiner.

10)☐ The drawing(s) filed on _____ is/are: a)☐ accepted or b)☐ objected to by the Examiner.

Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).

Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).

11)☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

12)☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

a)☐ All b)☐ Some * c)☐ None of:

1.☐ Certified copies of the priority documents have been received.

2.☐ Certified copies of the priority documents have been received in Application No. _____.

3.☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

1) ☐ Notice of References Cited (PTO-892)
2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
3) ☒ Information Disclosure Statement(s) (PTO/SB/08) Paper No(s)/Mail Date *03/05/2008*.
4) ☐ Interview Summary (PTO-413) Paper No(s)/Mail Date. _____.
5) ☐ Notice of Informal Patent Application
6) ☐ Other: _____.

DETAILED ACTION

Final

1. Claims 1-9 and 11-16 are currently pending in the instant application. Claim 10 have been canceled.

Maintained Rejection(s)

2. The rejection of claims 1, 3, 4, 7 and 12-14 under 35 U.S.C. 102(b) as being anticipated by Hashimoto et al. (U.S Pat. 6,372,185) is maintained for the reasons therein.

3. The rejection of claims 2, 8, 9, 11, 15 and 16 under 35 U.S.C. 103(a) as being unpatentable over Hashimoto et al. (U.S Pat. 6,372,185) in view of Oda et al. (U.S Pat. 7,001,539) is maintained for the reasons therein.

4. The rejection of claims 5 and 6 under 35 U.S.C. 103(a) as being unpatentable over Hashimoto et al. (U.S Pat. 6,372,185) in view of Nishide et al. (U.S Pat. 7,001,539) is maintained for the reasons therein.

Withdrawn Rejection(s)

5. The rejection of claims 5 and 6 under 35 U.S.C. 112, second paragraph, as being indefinite is withdrawn in view of Applicant's remark.

Information Disclosure Statement

6. The information disclosure statement (IDS) filed on 03/05/2008 has been considered. An initialed copy accompanies this Office Action.

(Previous Rejections)

Claim Rejections - 35 USC § 102

7. The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

> A person shall be entitled to a patent unless –
>
> (b) the invention was patented or described in a printed publication in this or a foreign country or in public use or on sale in this country, more than one year prior to the date of application for patent in the United States.

8. Claims 1, 3, 4, 7, 12-14, are rejected under 35 U.S.C. 102(b) as being anticipated by Hashimoto et al. (U.S Pat. 6,372,185 hereinafter, "Hashimoto").

With respect to claims 1, 4, 7, 13, and 14, Hashimoto teaches a method for preparing an Ag-Pd conductive paste for ceramic thick film printed circuit board. Hashimoto teaches the conductive paste are manufactured by kneading a mixture of 60-80% weight of conductive powder (Ag), 5-20% weight Pd resinate (Pd content in the resinate being 5-15%) and 2-6% weight of inorganic binder with an organic vehicle made by dissolving 1-5% weight of ethyl cellulose (binder) in 10-20% weight of organic solvent to form a paste (i.e. clay-like mixture) (Col. 1, lines 33-38 and Col. 4, lines 20-34). Additional organic binder such as 0.5-2% weight of polyvinyl butyral may be added

to the paste in order to reduce shrinkage during sintering (Col. 7, lines 21-24 and lines 37-39). Hashimoto teaches the organic solvent can be a mixture of organic solvent such as alpha-terpineol, dibutylphthalate, butyl carbitol acetate, and alkyl benzene is used (Col. 4, lines 34-38). The foregoing material (i.e. conductive paste) is mixed and kneaded by an automatic mortar (i.e. kneader) or a three roller mill (Col. 4, lines 38-39). The paste is filtered with a 400 mesh stainless screen. Organic solvents are added to the filtered paste to adjust its viscosity (Col. 4, lines 39-41; Examples 1 and 4). The disclosure of organic solvent added to the kneaded (filtered) paste mixture is considered to read on the claimed limitations of "a slurry step of adding the same solvent as used at the kneading step to the mixture obtained by the kneading step of lower the viscosity of the mixture, thereby slurrying the mixture".

The reference specifically or inherently meets each of the claimed limitations. The reference is anticipatory.

Regarding claim 3, Hashimoto disclosure inherently teaches a method of manufacturing a conductive paste having a solid concentration within the claimed range. a maximum content of 80% weight of Ag powder and a maximum of 20% weight of Pd resinate (Pd content in the resinate being 15%) to yield a total of 83% weight of conductive particle (Ag-Pd). Hashimoto also teaches a maximum of 6% weight of inorganic binder and a maximum of 5% weight of organic binder kneaded in organic solvent (Examples 1 and 4).

Regarding claim 12, Hashimoto teaches the conductive material are mixed and kneaded by automatic mortar or a three roll mill (Col. 3, lines 20-22).

Claim Rejections - 35 USC § 103

9. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

> (a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negatived by the manner in which the invention was made.

10. Claims 2, 8, 9, 11, 15, and 16 are rejected under 35 U.S.C. 103(a) as being unpatentable over Hashimoto et al. (U.S Pat. 6,372,185) as applied to the above claims, and further in view of Oda et al. (U.S Pat. 7,001,539 hereinafter, "Oda").

Hashimoto is relied upon as set forth above. With respect to instant claim 2, 8, 9, 15, and 16, Hashimoto does not teach kneading until the mixture reaches the wetting point and a step of adding a dispersing agent to the mixture obtained by the kneading step, thereby slurry the mixture.

In the same field of endeavor, Oda teaches adding a solvent to wet the metal particles (Col. 3, line 61). Oda further teaches adding a surface active agent (i.e. dispersing agent) such as cation, non-ionic, and anionic surface active agent together with solvent to enhance the wetting effect of the solvent on the metal particles (Col. 3, lines 27-32). Oda also teaches adding any surface active agent at a rate of 0.05-10 weight units (weight parts) to 100 weight units of the metal particles into the mixture

(Col. 3, lines 32-34). Oda's surface active agent disclosure is considered to read on the instant claimed limitation of a polyethyleneglycol system dispersing agent whose HLB is 5-7.

Hashimoto and Oda references are combined because both teach analogous art. Therefore, it would have been obvious to one of ordinary skill in the art at the time of the invention to incorporate a step of adding a surface active agent and solvent to Hashimoto's method of preparing a conductive paste and kneading until the entire surface of the metal particles are wet (wetting point), as taught by Hashimoto in view of Oda, in order to prevent agglomeration of between fine metal particles.

Regarding claim 11, Hashimoto teaches agglomeration problems generated in a paste due to insufficient dispersion (Col. 1, line 66 to Col. 2, line 4) and benefits of a well dispersed paste in pattern printing (Col. 1, lines 57-65). Thus, it is within the expected skills of a skilled artisan to use a homogenizer to disperse the metal particles uniformly in the slurry mixture.

11. Claims 5 and 6 are rejected under 35 U.S.C. 103(a) as being unpatentable over Hashimoto et al. (U.S Pat. 6,372,185) as applied to the above claims, and further in view of Nishide et al. (U.S Pat. 7,001,539 hereinafter, "Nishide").

Hashimoto is relied upon as set forth above. With respect to instant claims 5 and 6, Hashimoto teaches steps of adding 60-80% weight of conductive powder (Ag) and 5-20% weight Pd resinate (Pd content in the resinate being 5-15%) with an organic

vehicle made by dissolving 1-5% weight of ethyl cellulose (binder) in 10-20% weight of organic solvent to form a paste having a solid concentration of 84-94% or more specific 85-92% (Col. 1, lines 33-38 and Col. 4, lines 20-34).

Hashimoto failed to suggest a step of adding 100 parts (about 85% weight or more specific 90% weight) of conductive powder to said binder and said solvent.

In the same field of endeavor, Nishide teaches steps of adding 40-90 wt % of electrically conductive components with 10-55 wt % of organic vehicle component (Col. 6, lines 28-31). Nishide organic vehicle component is considered to include organic solvent and organic binder.

Hashimoto and Nishide references are combined because both teach analogous art. Therefore, it would have been obvious to one of ordinary skill in the art at the time of the invention to adding 90% weight of conductive powder as taught by Nishide with Hashimoto's organic vehicle made by dissolving 1-5% weight of ethyl cellulose (binder) in 10-20% weight of organic solvent to form a paste having a solid concentration of 84-94% or more specific 85-92% because such as method containing conductive powder, binder and solvent in the claimed ranges is expressly suggested by the prior arts and therefore is an obvious method.

Response to Arguments

12. Applicant's arguments filed on 03/05/2008 have been fully considered but they are not persuasive.

In response to Applicant's remark on pages 2 to 7, Applicant argues that Hashimoto does not anticipate the above listed claims because Hashimoto failed to disclose "forming a clay-like mixture." The Examiner respectfully disagrees with the Applicant argument. The phase "clay-like mixture" of the instant invention refers to the morphology of the composition, specifically a composition having a high viscosity. As recited in claim 1, the composition comprising of a conductive powder, a binder and a solvent is kneaded to form a clay-like mixture or to form a mixture having a high viscosity. Hashimoto teaches a conductive paste prepared by the same method of kneading with the same ingredients such as conductive silver powder and a inorganic binder with an organic vehicle containing ethyl cellulose (binder) and organic solvent to form a paste (Col. 1, lines 33-38 and Col. 4, lines 20- 34). Although Hashimoto does not specifically refer to his mixture as "a clay-like mixture," nonetheless the conductive paste of Hashimoto inherently read on the claimed clay-like mixture because Hashimoto teaches a paste mixture containing the same ingredients prepared by the same method. The word "paste" use to described Hashimoto composition is known in the art to be a mixture of high viscosity and is considered an equivalent term as clay-like mixture. Thus, the paste mixture of Hashimoto is considered readable on the claimed clay-like mixture.

Applicant also argues that Hashimoto failed to suggest "adding the same solvent as that used at the kneading step to the mixture obtained by the kneading step to lower the viscosity of the mixture." The Examiner respectfully disagrees with the Applicant argument. At column 4 lines 34-40 and column 7 lines 24-31, Hashimoto teaches a

paste containing organic solvents such as alpha-terpineol, dibutyl phthalate, butyl carbitol acetate and alkyl benzene is kneaded and filtered with a mesh screen. In the following sentence (Col. 4, lines 40-41 and Col. 7, lines 31-32), Hashimoto teaches the "organic solvents are added to the filtered paste to adjust its viscosity." (Please see Examples 1 and 4). Since the organic solvent was mention in the same paragraph, in consecutive sentences, the organic solvents described by Hashimoto leads to the interpretations that the same organic solvent used in forming the filtered paste is also used for adjusting the filtered paste viscosity. In addition, Hashimoto suggested only four types of organic solvent (i.e. alpha-terpineol, dibutyl phthalate, butyl carbitol acetate and alkyl benzene) in his entire disclosure. Therefore, one of ordinary skill in the art can conclude that the organic solvent disclosed by Hashimoto refers to one of the four types of solvent mention and is the same solvent used for forming the filtered paste and adjusting the said paste viscosity.

Applicant further argues that Hashimoto failed to teach the solids concentration of the mixture reaches 84 to 94 % as recited in claim 3. The Examiner respectfully disagrees with the Applicant argument. The Office Action, page 5, clearly calculated the concentration of conductive particles (Ag-Pd) in the conductive paste of Hashimoto to be 83 wt %. Hashimoto further teaches the said paste comprising 2-6 wt % inorganic binder, 1-5 wt % of organic binder and 10-20 wt % organic solvent (Examples 1 and 4). The sum of solid concentration in Hashimoto's paste may have a maximum concentration of 94 wt % after kneading since the conductive particles may be in an amount of 83 wt %, inorganic binder at 6 wt % and organic binder at 5 wt %. Therefore,

one having an ordinary skill in the art having read Hashimoto disclosure can easy produce a conductive paste having a solid concentration within the claimed range by using the maximum amount of conductive particles, inorganic binder and organic binder as suggested by Hashimoto.

Applicant argues that Hashimoto failed to teach a continuous dispersion and use of a colloid mill which belongs to a close type emulsifier as recited in claim 12. At page 5 of the remarks, Applicant stated "the device used in Hashimoto, namely, the mortar and the three roll mill, belong to an open type emulsifier." The Examiner respectfully disagrees with the Applicant argument and remarks. First, the examiner would like to point out that the instant claim language does not recite or require a closed type emulsifier device as argued. Second, nowhere in Hashimoto disclosure does Hashimoto teaches the mortar and the three roll mill to be an open type emulsifier as stated by the Applicant. Therefore, the Applicant's opinion can not take place of factual evidence. Lastly, at paragraph [0024] of the specification, Applicant discloses using a closed type emulsifier, namely a three-roll mill, to continuously disperse the slurry. Hashimoto also discloses using a three roll mill for mixing and kneading (Col. 3, lines 21-22). Thus, the three roll mill of Hashimoto is also capable of continuously dispersing the slurry as claimed and can also be a closed typed emulsifier device as claimed.

Applicant further argues that Hashimoto in combination with Oda failed to teach the composition is kneaded until the mixture reaches a wetting point as recited in claim 2. The Examiner respectfully disagrees with the Applicant argument. Consider claim 2, Oda teaches the desire to enhance the wetting effect of the solvent on the conductive

metal particles by adding surface active agent together with the solvent (Col. 3, lines 27-29 and Col. 4, lines 5-10) to eliminate the aggregation of metal particles which causes various problems in reliability and improve the yield of electronic components (Col. 2, lines 33-44). In other words, Oda teaches the desire to have a conductive paste with wet conductive metal particles to improve the reliability and the yield of electronic components. Since wetting point indicates a time at which the entire surface of a material is wetted. The wetting point of a mixture, i.e. the time required to wet the material, can easily be obtained by through routine experimentation for best result. It would have been obvious to one of ordinary skill in the art at the time the invention was made to optimize the conductive paste of Hashimoto in view of Oda by kneading the said paste until the mixture reaches the wetting point through routine experimentation for best results in order to improve the reliability and the yield of electronic components as suggested by the prior art.

Applicant also argues that Oda failed to disclose the feature of claim 8 wherein the dispersing agent is added after the kneading step. The Examiner respectfully disagrees with the Applicant argument. The examiner would like to first point out that the instant claim language does not specifically recite a step of adding a dispersing agent (i.e. surface active agent) *after* the kneading step as argued. The instant claim recited "a step of adding a dispersing agent to the mixture obtained by the kneading step, thereby slurry the mixture." Oda teaches a step of adding a surface active agent to a paste mixture and the paste mixture is obtained by kneading. In addition, Hashimoto teaches a step of adding a solvent to a filtered pasted (i.e. paste after

kneading step) to adjust the said paste viscosity (Col. 4, lines 40-41). It would have been obvious to one of ordinary skill in the art having the desire to optimizes the method by incorporating a step of adding a surface active agent of Oda at different stages of production (i.e. before or after kneading) to prevent metal particles from aggregation which will reduce the viscosity.

Applicant further argues that Oda failed to disclose a polyethyleneglycol system dispersing agent or the HLB of a dispersing agent. The Examiner respectfully disagrees with the Applicant argument. Oda teaches any surface active agents known in the art including non-ionic surface active agents can be used to assist the solvent in wetting the metal particles (Col. 3, lines 27-23). Since polyethyleneglycol is a well known non-ionic surface active agent that is commonly use and commercially available in the art, it is within the expected skills of a skilled artisan to select polyethyleneglycol system dispersing agent as the non-ionic surface active agent. Although, Oda does not explicitly disclose the HLB range of the surface active agent to be from 5 to 7. It is know in the art that polyethyleneglycol system dispersing agent may have a HLB ranging from 1-14. One of ordinary skill in the art at the time the invention was made can easily determine the optimal HLB of a polyethyleneglycol system dispersing agent by selecting a surface active agent having a HLB value in a known range and optimized for the best results.

Lastly, Applicant argues that Hashimoto and Nishide in combination failed to teach the concentrations of binder, solvent and conductive powder recited in claims 5 and 6. The Examiner respectfully disagrees with the Applicant argument. The

examiner would like to first point out that the instant claims contain a transitional term "comprises" which rendered the claims inclusive or open-ended and does not exclude additional, unrecited elements or method steps. As correctly acknowledged by the Applicant at page 7 of remarks at lines 3-4, Hashimoto teaches a paste further containing 2 to 6% weight of inorganic binder (Col. 1, lines 33-38). The addition of inorganic binder is commensurate within the scope of the claim since the "comprises" terminology permits additional elements or method steps. Moreover, Hashimoto teaches an organic binder in an amount of 1-5 wt % and organic solvent at an amount of 10-20 wt % (Col. 4, lines 33-38). The lower limit of the disclosed organic binder and organic solvent is within the claimed amount. Hashimoto teaches the conductive powder may be used in an amount as high as 83 wt %. Nishide teaches a conductive paste containing up to 90 wt % of conductive powder. Hashimoto in combination of Nishide teaches the binder, solvent and conductive powder within the claimed amount.

Based on the above rational, it is believed that the claimed limitations are met by the reference submitted and therefore, the rejection is maintained.

Conclusion

13. **THIS ACTION IS MADE FINAL.** Applicant is reminded of the extension of time policy as set forth in 37 CFR 1.136(a).

A shortened statutory period for reply to this final action is set to expire THREE MONTHS from the mailing date of this action. In the event a first reply is filed within

TWO MONTHS of the mailing date of this final action and the advisory action is not mailed until after the end of the THREE-MONTH shortened statutory period, then the shortened statutory period will expire on the date the advisory action is mailed, and any extension fee pursuant to 37 CFR 1.136(a) will be calculated from the mailing date of the advisory action. In no event, however, will the statutory period for reply expire later than SIX MONTHS from the mailing date of this final action.

Any inquiry concerning this communication or earlier communications from the examiner should be directed to KHANH T. NGUYEN whose telephone number is (571) 272-8082. The examiner can normally be reached on Monday-Friday 8:00-5:00 EST PM.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Randy Gulakowski can be reached on (571) 272-1302. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see http://pair-direct.uspto.gov. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free). If you would like assistance from a USPTO Customer Service Representative or access to the automated information system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.

/KTN
07/07/2008

/DOUGLAS MC GINTY/
Primary Examiner, Art Unit 1796